

REMARKS

Claims 1-5 are pending in the application.

Claims 1 and 2 have been amended in order to more particularly point out, and distinctly claim the subject matter to which the applicant regards as his invention. It is believed that this Amendment is fully responsive to the Office Action dated **September 18, 2002**.

Objection to the Drawings

In compliance with the request of the outstanding Office action, a prior art label is added to each of Figures 1, 2 and 3. Reconsideration and withdrawal of this objection are respectfully requested.

Figure 4 has been amended to show a control type magnetic bearing. Reconsideration and withdrawal of this objection are respectfully requested.

Claim Rejections under 35 USC §112

Claims 1, 2, 3, 4 and 5 are rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the present application.

The relevant claim has been amended, as needed, to overcome this rejection.

Regarding the claim language comparator circuit, the Applicant believes this is already sufficiently concise, full and clear. Therefore, the Applicant do not wish to add any further details. However, the Applicant appreciates the Office in affording the Applicant this opportunity to add further details.

Regarding the claim language of a remover for removing a displacement sensor carrier frequency signal band, the Applicant believes this is already sufficiently concise, full and clear. Therefore, the Applicant do not wish to add any further details. However, the Applicant appreciates the Office in affording the Applicant this opportunity to add further details.

Reconsideration and withdrawal of this objection are respectfully requested.

Claim Rejections under 35 USC §102

Claims 1, 2, 3, 4 and 5 are rejected under 35 USC §102(b) as being anticipated by Shinozaki (WO 99/41510).

The port shown in fig. 8 of WO99/41510 and which receives an “Input Signal” is a control signal input. for the purpose of limiting an amplitude of the input control signal, a Zener diode is inserted to a feedback loop of operational amplifier 25. In actuality, saturation would occur in an internal circuit if a voltage signal higher than a supply voltage for driving the operational amplifier is input, resulting in the deterioration in frequency characteristic of signal transmission. To avoid this, the Zener diode is used in operational amp 25. Zener diodes 29 are inserted in a feedback loop of operational amplifier 28 for the same purpose.

In other words, since gain adjusting operational amplifier 28 downstream of signal adding point 27 has Zener diodes 29, operational amplifier 28 operates as a non-linear component if a relatively large signal is input. However, operational amplifier 28 is not in such a condition that a large signal is input, if amplifier 28 operates steadily in a region where the amplifier operates as a linear component.

In such a conventional circuit structure, operational amplifier 28 will not operate properly if a large gain is set to gain adjusting operational amplifier 28 causing the amplifier to perform both signal adding and gain adjusting functions.

In order to eliminate such a problem, the present invention is distinguished therefrom, in part, by inserting a non-linear component in a stage after a stage where signal adding and gain adjusting processes are performed.

It should be noted that independent claim 1 has been further amended as follows:

“1. (Amended) A magnetic bearing apparatus having a power amplifier for supplying a control current to a coil of an electromagnet of a control-type magnetic bearing, said apparatus characterized in that a non-linear component is provided in [the rear of] a stage after a stage where a control input signal of said power amplifier and a current feedback signal are added.”

The claimed invention is supported by way of examples as shown in Figure 4, where there is indeed shown a magnetic bearing apparatus having a power amplifier (Fig. 4) for supplying a control current (I) to a coil of an electromagnet of a control-type magnetic bearing (Fig. 4), said apparatus characterized in that a non-linear component is provided in a stage (8) after a stage (3-1A) where a control input signal (S1) of said power amplifier and a current feedback signal (S2) are added.

Claim 2 is supported by way of an example in Figure 5, where there is indeed shown a comparator circuit.

Claim 3 is supported by way of an example in Figure 7, where there is indeed shown that a remover (8) is provided at an output side of the non-linear component (7) for removing a displacement sensor carrier frequency signal band.

Claim 4 is supported by way of an example in Figure 8, where there is indeed shown that a remover (9) is provided at an input side of said non-linear component (7) for removing a pulse width modulation (PWM) power amplifier carrier frequency signal band.

Claim 5 is supported by way of an example in Figure 8, where there is indeed shown that a first remover (9) is provided at an input side of said non-linear component (7) for removing a pulse width modulation (PWM) power amplifier carrier frequency signal band and that a second remover (8) is provided at an output side of said non-linear component (7) for removing a displacement sensor carrier frequency signal band.

“Shinozaki discloses in Figure 8 a magnetic bearing apparatus having a amplifier (35) for supplying a control current to a coil of an electromagnet (21) of a control-type magnetic bearing in which an apparatus characterized in that a non-linear component (comparator circuit)(31) is provided in the rear of a stage. Including a control input signal of the amplifier (35) and a current feedback signal (39d) are added. In addition a remover (LPF)(39) is provided at an output side of the non-linear component (31) for removing a displacement sensor carrier frequency signal band, with a remover (BEF)(30) provided at an input side of the non-linear component (31) for removing a pulse width modulation (PWM) power amplifier carrier frequency signal band.”

It should be noted that the Office asserted current feedback signal along 39d is amplified by current detector and amplifier 39d, filtered by LPF for eliminating frequency components of PWM switching 39c, adjusted by offset adjuster 39b and adjusted by gain adjuster 39a. Therefore, the claimed invention is not disclosed in Shinozaki

It is well settled that:

"A claim is anticipated only if each and every element *as set forth in the claim* is found, either expressly or inherently described, in a single prior art reference." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1567, 7 USPQ2d 1057 (Fed. Cir. 1988)."

Should the Office continue to believe that the claimed invention is anticipated by the asserted prior art, a citation of where each and every claimed feature, either as column number and line number, or figure number and reference numeral, or a combination thereof, as disclosed in the asserted prior art is respectfully requested. Should the Office determine that any claimed feature is not disclosed in the asserted prior art, it is respectfully submitted that the claimed invention is not anticipated by the asserted prior art. Allowance of the claimed invention is then respectfully requested.

Conclusion

In view of the aforementioned amendments and accompanying remarks, claims 1 and 2, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the drawings and claims 1 and 2 by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,
ARMSTRONG, WESTERMAN & HATTORI, LLP



Michael N. Lau
Attorney for Applicant
Reg. No. 39,479

MNL/alw
Atty. Docket No. **010954**
Suite 1000, 1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930



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PATENT TRADEMARK OFFICE

Enclosures: Version with markings to show changes made
Request for Approval of Drawing Corrections w/Figs. 1- 4, marked in red ink

IN THE DRAWINGS:

Please amend Figures 1- 4 as indicated in the attached Request for Approval of Drawing Changes.

IN THE CLAIMS:

Please amend claims 1 and 2 as follows:

1. (Amended) A magnetic bearing apparatus having a power amplifier for supplying a control current to a coil of an electromagnet of a control-type magnetic bearing, said apparatus characterized in that a non-linear component is provided in [the rear of] a stage after a stage where a control input signal of said power amplifier and a current feedback signal are added.

2. (Amended) A magnetic bearing apparatus as claimed in claim 1, characterized in that said non-linear component is a [conparator] comparator circuit.